

REMARKS

Claims 1-16, 19-46, 48-97, and 99-105 are now pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

Claims 19, 30, 35, 48, 49, 51, 54, 59, 66, 73, 86, 87, 90, 99, and 100 are amended by this amendment.

The claims presented above are shown as required by 37 CFR §1.173 for claim amendments in a reissue application. Applicants provide the following attachment of "Claim Attachment" for reference and convenience of the Examiner to indicate the included amendments of the claims in comparison to the immediately prior version of the claim. The following attachment is not intended to be the official or complete listing of all pending claims.

INTERVIEW SUMMARY

Applicants thank the Examiner for the brief interview on May 18, 2011. The cited art of Coddington was discussed in light of the previously pending claims and a tracking an active member. No agreement as to allowability of the pending claims was reached.

INTERVIEW REQUEST

Applicants respectfully request that the Examiner contact Applicants' representative via telephone at 248-641-1600 to expedite prosecution of the subject application if all of the claims are not found to be in condition for allowance.

SUPPORT FOR THE AMENDMENTS TO THE CLAIMS AS REQUIRED BY 37 C.F.R. §1.173(c)

As discussed above, the above claim section is drafted in appropriate re-issue format and the following "Claim Attachment" shows the amendment to the claims as compared immediately previously pending claim.

Support for the amendments to the claims can be found in the issued U.S. Patent 5,868,675 is noted below.

Claims 48, 49, 51, 59, and 66 are amended only to for proper dependency due to canceled Claim 47.

Claim 19 can be found at least at column 4, lines 55-67; column 7, lines 27-35 and 48-52; column 11, lines 17-20; column 17, lines 5-16; and Fig. 10.

Claim 30 can be found at least at column 5, line 60 to column 6, line 2.

Claim 35 can be found at least at column 5, lines 45-60.

Claim 54 can be found at least at column 4, lines 55-67; column 7, lines 27-35 and 48-52; column 11, lines 17-20; column 17, lines 5-16; and Fig. 10.

Claim 73 can be found at least at column 4, lines 55-67; column 7, lines 27-35 and 48-52; column 10, lines. 31-35 and 55-60; column 11, lines 17-20; column 17, lines 5-16; and Fig. 10.

Claim 86 can be found at least in column 4, lines 55-67; column 7, lines 27-35 and 48-52; column 10, lines. 31-35 and 55-60; column 11, lines 17-20; column 17, lines 5-16; and Fig. 10.

Claims 87 can be found at least at column 4, lines 55-67; column 7, lines 27-35 and 48-52; column 11, lines 17-20; column 17, lines 5-16; and Fig. 10.

Claim 90 can be found at least at column 5, line 60 to column 6, line 2.

Claim 99 can be found at least in column 4, lines 55-67; column 7, lines 27-35 and 48-52; column 10, lines 31-35 and 55-60; column 11, lines 17-20; column 17, lines 5-16; and Fig. 10.

Claim 100 can be found at least at column 10, lines 31-35 and 55-60.

OATH/DECLARATION

All claims are rejected as a Supplemental Re-Issue Oath/Declaration must be received prior to issuance of application. This rejection is respectfully traversed.

Applicants respectfully request that the requirement for a Supplemental Re-Issue Declaration be held in abeyance until all claims have been indicated as allowable pending submission of a Supplemental Re-issue declaration. Presently Applicants submit that at least Claims 1-16 and 62-64 are allowable with the submission of a Supplemental Re-Issue Declaration. Applicants submit that the presently pending claims are in condition for allowance, and once so indicated will execute a Supplemental Re-Issue Declaration in proper format to allow issuance of the subject application.

REJECTION UNDER 35 U.S.C. § 112

Claims 48-59 and 66 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed.

Claims 48-59 and 66 have been amended so that they depend from presently pending claims. Accordingly, Applicants request withdrawal of the outstanding 35 U.S.C. § 112, second paragraph rejections.

REJECTION UNDER 35 U.S.C. § 103

Claims 19-33, 38-40, 44-53, 55-61, 65-72, 87-97 and 103-105 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Allen (U.S. Pat. No. 4,945,914) in view of Strohl Jr. et al. or Van Steenwyk et al. Claims 34-37 and 41-43 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Allen ('914) in view of Strohl Jr. et al or Van Steenwyk et al. as applied to Claims 29 and 30 above, and further in view of Lewin. Claims 54, 99-102 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Allen ('914) in view of Codrington and Strohl Jr. et al. or Van Steenwyk et al. as applied to Claims 51 and 87 above, and further in view of Codrington. Claims 73-86 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Allen ('914) in view of Codrington and Strohl Jr. et al. or Van Steenwyk et al. These rejections are respectfully traversed.

Applicants have previously discussed the cited art and provide only the following comments in light of the current amendments and the following arguments.

As noted by the Office, Allen fails to disclose at least an electromagnetic tracking system and an optical tracking system. See, Office Action mailed January 24, 2011, pg. 3, Ins. 15-17 and pg. 4, Ins. 10-11. Strohl, Van Steenwyk and Lewin are cited to disclose tracking systems. Applicants respectfully submit that Allen also fails to disclose

a tracking system of any type that renders obvious, either alone or in combination, a tracking system or tracking as presently claimed and further argued herein.

The references to Strohl and Van Steenwyk are cited for disclosing electromagnetic tracking systems. See, the Office Action, pg. 3, Ins. 17-18. However, Strohl, as illustrated at least in Fig. 1, requires an interconnection of two portions 10, 12 with a single system. An emitter coil in one of the portions emits a field to be sensed by the other portion and the interconnected system can indicate a phase change and alignment of fields with receiver coils. Strohl further describes indicators (e.g. LEDs) can indicate whether a source is proximal to the tip of a catheter or distal to a tip of a catheter. See, Strohl, col. 4, Ins. 5-10. Accordingly, Strohl discloses a system that can indicate whether a directly coupled source 18 is positioned distally or proximally of a tip 14 rather than relative to any reference frame. The location of the tip relative to any frame of reference other than the source is undisclosed.

Van Steenwyk similarly describes a system that couples two portions, a first portion 11 including two transmitters and a second portion 21 including an antenna, with a single meter. Van Steenwyk describes that the catheter can be inserted into a body to and then a user moves the instrument 11 over a possible location of the catheter positioned within the patient. A reading on the meter M1 can then be noted to determine whether the transmitter is positioned over the tip. See, Van Steenwyk, col. 5, Ins. 33-50. Again, Van Steenwyk only determines a relative position between two coupled portions.

Neither Strohl, nor Van Steenwyk indicates that the location of catheter positioned within a patient is being determined or tracked relative to any reference

frame beyond the coupled member. In other words, the location of the catheter is only known relative to the transmitter when it is close enough to couple with the catheter. Thus, Strohl and Van Steenwyk can not disclose a system of method of determining a location in a first reference frame and correlating it with a second reference frame.

Lewin discloses that a field generator including two bar magnets 3a, 3b can be arranged at an angle less than 180 degrees and positioned within the jaw of a patient's head. Positioned externally to the patient is an arrangement 5 that can include three plates positioned perpendicular to each other and mounted to a patient's cranium via a mounting member 6, as illustrated in Fig. 1. The bar magnets generate magnetic fields that can be detected by the plates of the arrangement 5 and fluxes can be presented on an indicator 11 in the form of the evaluable signals. See, Lewin, col. 2, Ins. 47-67 and col. 3, Ins. 19-27. Accordingly, Lewin discloses that a plate fixed to a patient's head can be used to determine movement of a bar magnet that is fixed to a patient's jaw. Applicants' review of Lewin, respectfully, fails to identify a disclosure of an optical tracking system. Applicants performed a word search for optical and could not find the word optical in the U.S.P.T.O. full text database of the Lewin patent. Applicants did note that the word 'light' appears once in the "Summary of the Invention" to indicate that the field generator could also be a 'light source.' See, Lewin, col. 2, Ins. 12-14. Applicants respectfully submit, however, that a light source would not properly provide a field that would generate a flux that could be identified by magnetic field sensors as disclosed by Lewin. Accordingly, Applicants respectfully submit that Lewin does not disclose or enable any optical tracking system.

None of the above references disclose a system for illustrating a tracked position of an active member relative to pre-acquired image data. Codrington discloses that its principle purpose is to provide accurate location and monitoring of a catheter tip. Codrington, however, shows a location of a catheter only by acquisition of present NMR images. See, Codrington, col. 2, Ins. 53-55. Codrington describes that imaging a catheter loop is performed, alternatively on and off, in adjacent NMR images (i.e. a first image imaging the catheter and a second image not imaging the catheter). Subtractive processing can be used to emphasize the location of the catheter tip between the adjacent images. See, Codrington, col. 2, Ins. 55-60. The subtractive image is then superimposed on an additive display to illustrate the position of the catheter tip. See, Codrington, col. 2, Ins. 64-66. Functional elements (i.e. those that allow the catheter to be imaged) can then be removed and desired elements can then be inserted into the catheter, where it is assumed that the other elements are conductive and may adversely affect NMR imaging. See, Codrington, col. 3, Ins. 1-7. Thus, Codrington illustrates the position of the catheter by subtractive imaging of the catheter and displaying the subtractive image on another NMR image of the patient. The only illustration of the catheter relative to an image of a patient is by subtractive processing of consecutive NMR images of a patient, ones including images of the catheter and ones not including images of the catheter.

Independent Claim 87

Contrary to the cited art, Independent Claim 87 now recites "accessing a first image data of the region of the patient captured with an imaging system . . . correlating

the position of first reference structure . . . with the position of the second reference structure . . . ; and tracking an active member at least to determine a position of the active member in the patient reference frame to determine a location of the active member based on the tracking of the active member and transmitting the determined position in the patient reference frame for display on a display device relative to the image reference frame of the first image data based at least on the correlation of the first reference structure and the second reference structure.” Applicants respectfully submit that the cited art is completely silent regarding accessing image data and then correlating a first reference structure and a second reference structure to correlate the image data and the patient for displaying the location of an active member that is tracked in the patient reference frame on the first image data. As discussed above, Allen does not disclose any tracking systems for tracking an active member. Further, the systems of Strohl and Van Steenwyk only illustrate coupling between two interconnected portions and identifying the flux therethrough by moving a transmitter close to a receiver to induce a flux within the receiver. Lewin also measures a flux through a plurality of sensors fixed on an apparatus positioned relative to the patient. None of these references disclose tracking an active member in a patient reference frame and being able to display the tracked position on an image based on a correlation of two reference frames. At least Van Steenwyk and Strohl are completely silent regarding any reference frame and determines the location of a moving antenna relative to a moveable transmitter. Lewin fixes a source to a jaw and a sensor to a head of a patient, but discloses no correlation between two reference frames. In fact, these references do not require or desire reference frames as they disclose only flux systems

to determine location relative to a transmitter rather than relative locations within two correlated reference frames. Thus, none of these references allows for the determination of a location of an active member for display on a display device relative to an image reference frame of the first image data.

Codrington also fails to disclose any tracking of an active member for determination and display on a display device. Codrington only displays a catheter due to subtractive and additive imaging of adjacent images of a NMR imager and fails to disclose determining a position of an active member based on tracking the active member in one reference frame and displaying it relative to a second reference frame. Codrington actually teaches away from displaying a position of a catheter based upon any correlation of a first and second reference frame or structure because Codrington requires adjacent images be acquired of the patient that include the catheter to display an image of the catheter on an additive image. Accordingly, Applicants respectfully submit that Independent Claim 87 is in condition for allowance in light of the cited art.

Independent Claims 19 and 73

Applicants that Claims 19 and 73 are also in condition for allowance over the cited art at least for the same reasons as Claim 87.

Claim 19 has been amended and now recites, "a tracking system operable to determine a position of at least the second reference structure and a position of the active member and configured to transmit the determined positions of second reference structure and the active member to the controller; wherein the controller is configured to determine the position of the active member based on the determined position of at

least the active member and the correlation of the first reference structure and the second reference structure.” Accordingly, Claim 19 is directed to a tracking system to determine and transmit a position of an active member and a controller configured to determine the position of the active member based on tracking with the tracking system and the correlation of the first and second reference structure. As discussed above, the cited art fails to disclose a tracking system to track an active member and a determination of a position based on the correlation of two reference structures, one in the image and one with the patient.

Claim 73 now recites, “a tracking system operable to track the position of the active member in relation to the patient reference frame, the tracking system being in communication with the controller to transmit the tracked position of the active member as a position information to the controller, wherein the controller is operable to determine the position of the active member relative to the image reference frame; and a display operable to display the real-time position of the active member in the image reference frame based on the controller determined position of the active member based on the tracked position of the active member from the tracking system, wherein the controller is configured to generate a representation of the active member that is displayed on the display relative to a display of the received image data.” Accordingly, Claim 73 is also directed to a tracking system to track a position of an active member and a controller to generate a representation of the active member for display relative to image data based on the tracked active member and the correlation of two reference structures.

Thus all of the pending independent claims are in condition for allowance in light of the cited art.

DEPENDENT CLAIMS

Additionally, Applicants respectfully submit that claims that depend from Independent Claim 87 also include patentable subject matter. For example, dependent Claim 99 recites “displaying the position of the active member as a representation of the active member in the accessed first image data that is captured image data that is correlated to the patient based on the correlation and displayed on a display device with the position of the active member being correlated between the patient reference frame defined by the first reference structure fixed to the patient and the image reference frame based on the tracking of the active member.” Applicants respectfully submit that displaying the position of an active member based on tracking the active member and a correlation between the patient reference frame and the image reference frame is missing from the cited art. As discussed above, Allen does not disclose tracking system as claimed and the locating systems disclosed in all of Strohl, Van Steenwyk, and Lewin are not directed to displaying on a display device a position of the active member due to the correlation of the patient reference frame and the image reference frame. Additionally, Codrington does not overcome the failing by requiring that the imaged displayed that illustrates the location of the catheter is identified only by illustrating a subtractive image of the catheter as an additive image on another image acquired of the patient and a NMR image system.

Other amended claims that depend from independent Claims 19 and 73 are similarly allowable. The cited art fails to disclose the claimed system including, for example, “a telemetry system operable to determine the position of the second reference structure in the patient reference frame and transmit the determined position to the controller, wherein the controller is operable to perform the correlation at least with the transmitted determined position”, as recited in Claim 30.

Applicants also respectfully submit that the art is silent regarding various specific features as recited in Claims 35 (e.g. cameras), 43 (e.g. a laser beam to illuminate a portion), and 57 (e.g. illustrating an optimal path). Thus, at least these dependent claims also include patentable subject matter in light of the cited art.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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By: Richard W. Warner
Richard W. Warner, Reg. No. 38,043
Michael L. Taylor, Reg. No. 50,521

HARNESS, DICKEY & PIERCE, P.L.C.
P.O. Box 828
Bloomfield Hills, Michigan 48303
(248) 641-1600

RWW/MLT/srh